AD-A106 200 ARMY ENGINEER DISTRICT ST LOUIS MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. SUNSET LAKE DAM (MO 30341), MISSOU--ETC(U)
JUL 78 A L JOHNSON

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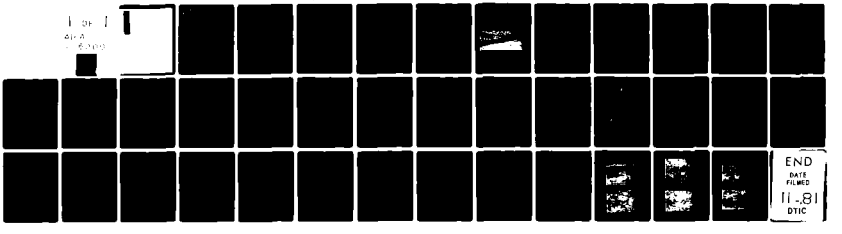

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.	

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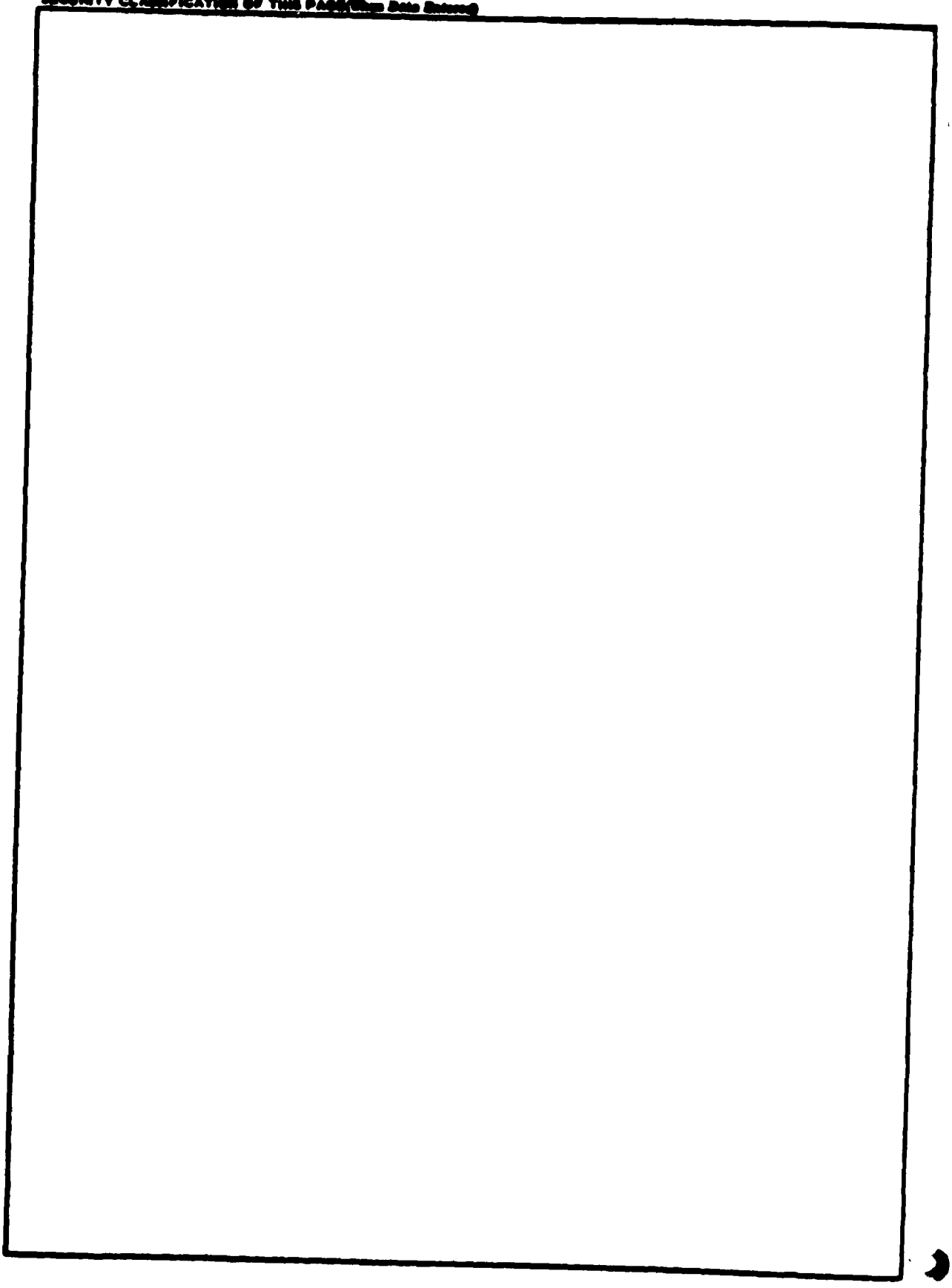


SUNSET LAKE DAM
COLE COUNTY, MISSOURI

MISSOURI INVENTORY NO. 30341

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY: ST. LOUIS DISTRICT CORPS OF ENGINEERS
FOR: GOVERNOR OF MISSOURI

JULY 1978

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Sunset
State Located	Missouri
County Located	Cole County
Stream	Unnamed tributary to Wears Creek
Date of Inspection	11 April 1978

Sunset Dam was inspected to assess the general condition of the dam with respect to safety, based on available data and visual observations. This dam was classified as a small size dam with a high downstream hazard potential. Over 50 homes and two schools within one mile downstream of the dam would be subject to appreciable damage and possible loss of human life could occur if the dam would suddenly fail.

The assessment of the dam size and hazard classification was based on "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed by the Chief of Engineers, U.S. Army, Washington D.C., with the help of Federal and state agencies, professional engineering organizations, and private engineers.

The guidelines specify that the appropriate criterion for adequate spillway capacity for a dam of this size and potential hazard is a minimum of one-half of the probable maximum flood. This flood is defined as resulting from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. This dam, in its current configuration, has no credible spillway. Only evaporation and seepage prevent overtopping by every rainstorm occurrence. Removal of the three metal plate stoplogs in the drop inlet spillway would provide approximately 18 inches of freeboard at the normal pool elevation. In that configuration, which is recommended as a minimum, the spillway capacity is seriously inadequate to prevent overtopping and will contain less than 10 percent of the probable maximum flood. A flood with 1 percent chance of occurrence in any one year (once in 100 years) will overtop the dam.

The only other visual deficiencies were in the category of minor maintenance. These consisted of broken concrete on the open manhole near the downstream toe of the dam, upstream slope erosion, and sediment and vegetation in the downstream exit channel.

No seepage or stability analysis records were found. In accordance with the above guidelines the absence of such records is a deficiency which should be rectified.

We recommend that the owner correct or control the deficiencies described above in accordance with the detail report submitted to the lake owner and the Governor of Missouri.

Ken Alexander

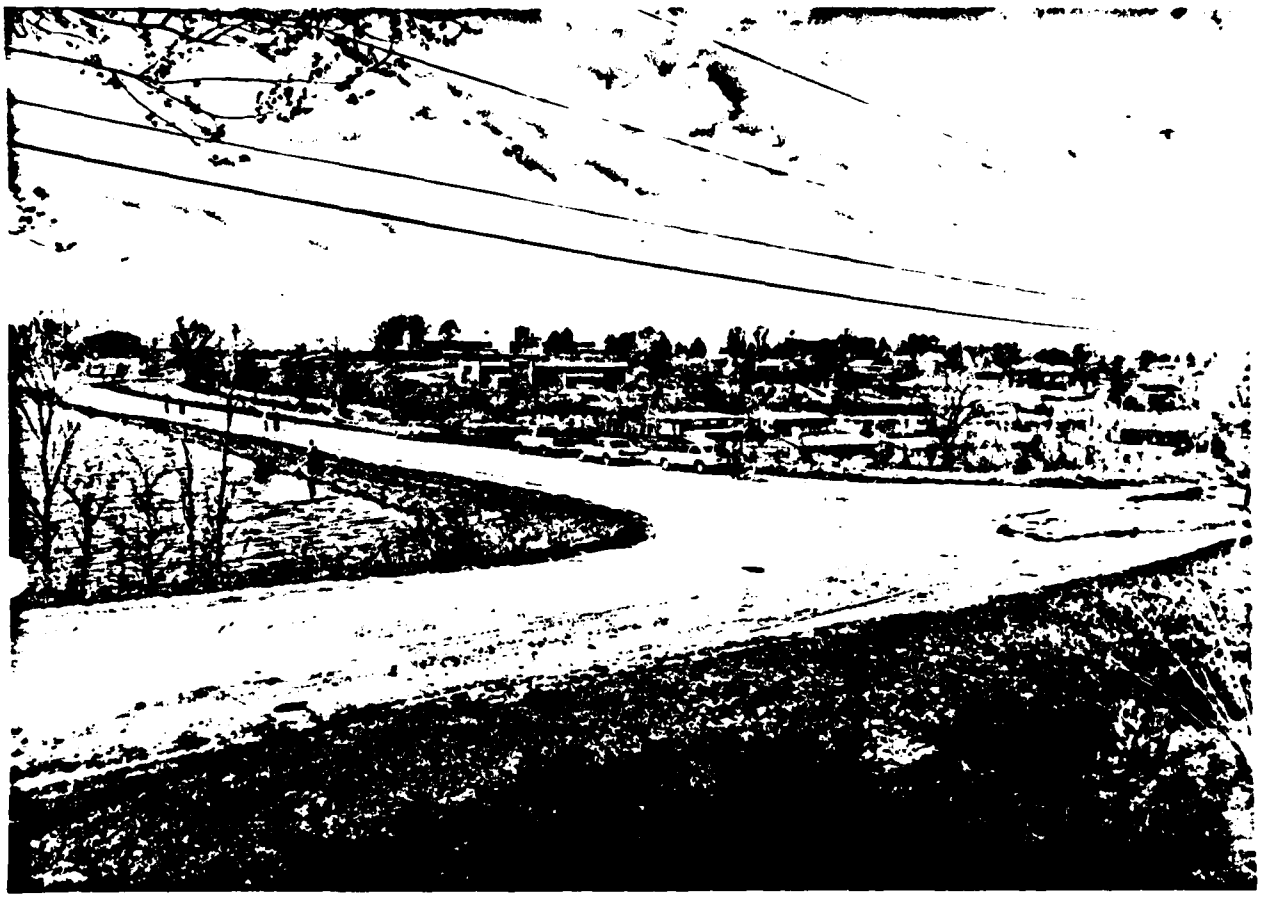
KEN ALEXANDER
Soils Engineer

Michael J. Cullen

MICHAEL CULLEN
Hydraulic Engineer

SUBMITTED BY: Arthur L. Johnson — Act. Chief, Engineering Division — 1 Sep 78 — Date

APPROVED BY: Leon E. Mehl — Colonel, CE, District Engineer — 1 Sep 1978 — Date



OVERVIEW OF LAKE AND DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SUNSET LAKE DAM - ID NO. 30341

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3	Spillway Exit Channel
4	Downstream Slope
5	Upstream Slope Above Water Level
6	Homes Downstream of Dam

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
SUNSET DAM ID NO. 30341

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of the Sunset Lake Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed with the help of several Federal agencies and many state agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth structure built in a small valley in the north-central portion of the Missouri Ozarks. Topography adjacent to the lake is rolling. Topography in the vicinity of the dam is shown on PLATE 1. Material for construction of the dam was the overburden upstream of the dam. There are no visible seepage or stability problems and none were reported by the owner.

(2) The spillway is of the drop inlet type with a 6 x 8 foot rectangular concrete box (about 12 feet deep) covered with a metal grate. Eighteen inch high removable steel plates were observed on three sides of the box (see Photo 1). A 36-inch corrugated metal pipe was connected to the concrete box and exited near the toe of the dam in an open top 4-foot by 4-foot concrete manhole (see Photo 2). This manhole was drained by a 42-inch pipe which entered a drainage ditch several hundred feet from the toe of the dam (see Photo 3).

(3) Pertinent physical data are given in paragraph 1.3 below.

b. Location. The dam is located in the north-central portion of Cole County, Missouri, just east of Jefferson City, Missouri. The lake formed by the dam is shown on the 1967 Jefferson City, Missouri quadrangle sheet in the southwest quarter of Section 13, Township 44N, Range 12W (see PLATE 1).

c. Size Classification. Criteria for determining the size classification of dams and impoundments are presented in Volume 1, Appendix D, Chapter 5, of the National Program of Inspection of Dams Report. Based on these criteria, this dam and impoundment is in the small size classification.

d. Hazard Classification. Criteria for determining hazard classification are presented in the same report as referenced in paragraph c above. Based on referenced criteria, this dam is in the High Hazard Classification. A high hazard dam is one which poses hazards to human life or extensive property damage should the dam suddenly fail. Over 50 homes and two schools are located within one mile downstream of this dam. These homes would be subjected to potential damage or more than a few human lives could be lost should this dam suddenly fail. A sudden failure of this dam may cause damage up to two miles downstream.

e. Ownership. This dam is owned by the Sunset Lake Realty Company, Inc., 1636 S. Ridge Drive, Jefferson City, Missouri.

f. Purpose of Dam. The dam forms a 12-acre fishing lake.

g. Design and Construction History. The only design data and construction history is that which was verbally reported by the owner. Construction on the lake began in 1945 and completed in 1949. Material for the dam embankment was excavated overburden upstream of the dam. It took approximately one year for the lake to reach normal pool elevation.

h. Normal Operating Procedure. Rainfall, runoff, and evaporation combine to maintain a relatively stable pool level in the lake. Plates in the spillway can be removed to lower the lake level approximately 18 inches. The pool reached normal level in 1950 and reportedly has never overtopped the dam.

1.3 PERTINENT DATA

a. Drainage Area - 100 acres.

b. Discharge at Damsite.

(1) Maximum known flood at damsite. Not known.

(2) Spillway capacity at maximum pool. Zero with metal plates in and 61 c.f.s. with plates removed.

c. Elevation (Feet Above M.S.L.).

(1) Top of dam - 736.5±.

(2) Spillway crest (gated) - 736.5.

(3) Streambed at centerline of dam - Est. 703.5.

(4) Maximum tailwater - Unknown.

d. Reservoir. Length of maximum pool - About 1100 feet.

e. Storage (Acre-feet).

(1) Maximum - 100

(2) Normal - 79

f. Reservoir Surface (Acres).

(1) Top of dam - 12.

(2) Spillway crest - 12.

g. Dam.

(1) Type - earth embankment.

(2) Length - 510 feet.

(3) Height - 33 feet maximum (est).

(4) Top width - 45 feet minimum.

(5) Side Slopes - 1 vertical on 3.9+ horizontal.

(6) Zoning - unknown.

(7) Impervious Core - unknown.

(8) Cutoff - unknown.

(9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel. None.

i. Spillway.

(1) Type - Open top concrete box drop inlet 6 x 8 foot with 36 inch corrugated metal pipe outlet.

(2) Length of weir - 6-foot by 8-foot rectangle.

(3) Crest elevation - 736.5.

(4) Gates - 18 inch removable metal plates on three sides of concrete box.

(5) Regulating Outlets - No outlets other than spillway removable metal plates described above.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design drawings or calculations are available for this dam. It was built by the owner and members of his family.

2.2 CONSTRUCTION

Construction was started in 1945 and completed in 1949. No construction records are available.

2.3 OPERATION

The owner periodically removes the metal plates in the spillway. No other operations were reported.

2.4 EVALUATION

a. Availability. The only data readily available is that which could be recalled by the owner.

b. Adequacy. Data available were not adequate to make a detailed engineering analysis of the dam. Based on guidelines furnished for the safety inspection of dams, the owner should have detailed seepage and stabilitly analyses performed.

c. Validity. No valid engineering design data or construction data were available.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. Sunset Lake Dam was visually inspected by a soils engineer and a hydraulic engineer on 11 April 1978. The owner met the inspection team and discussed briefly some of the history of the construction and performance of the dam. According to the owner, he knew of no seepage, stability, or overtopping problems since the dam was first filled in 1950. Observations made by the inspection team are discussed below.

b. Dam. The dam has a broad crest (45+ feet) and variable height from an estimated maximum of 33 feet to about 20 feet (see PLATE 2). The upstream slope was under water and was not observed, although it was reported by the owner to have same slope as the downstream.

No seeps, slides, cracks or detrimental settlement were observed.

As shown on Photo No. 4, the downstream slope is well maintained and has no trees or heavy vegetation which would be detrimental to the stability of the dam.

The top 1± foot of the upstream slope has eroded approximately 10 feet downstream since the pool was established in 1950. The owner reported that when the dam was constructed riprap was placed on the upstream slope beneath this small area of erosion. This riprap was beneath the water level and was not visible.

c. Appurtenant Structures. The only appurtenant structures were two concrete boxes as shown on Photos 1 and 2. The box in the upstream pool acts as a spillway intake and is connected to the box at the downstream toe by a 36-inch corrugated metal pipe. The downstream exposed portion of this pipe was in good condition. Drainage from the west abutment also enters this concrete box at the toe and is drained to a ditch on the north by a 42-inch corrugated metal pipe (see Photo No. 3). Erosion is occurring at this discharge point which is several hundred feet from the dam and does not affect the stability of the dam.

d. Reservoir Area. No wave wash, excessive erosion, or slides were observed along the shore line.

e. Downstream Channel. Only observed erosion was that discussed in parapgraph c above at the discharge end of the 42-inch pipe. Channel is clogged with vegetation growing in it.

3.2 EVALUATION

None of the conditions observed on the dam pose a serious threat to its stability. The spillway capacity and adequacy is discussed in Section 5.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The only regulating works that exist are the removable 18-inch metal plates on the concrete box spillway. These plates are operated at the owners discretion.

4.2 MAINTENANCE OF DAM

As shown on Photo 4, the downstream slope has been mowed and has no evidence of any brush or tree growth.

4.3 MAINTENANCE OF OPERATING FACILITIES

The three 18-inch plates on the spillway were reported to be operative but not observed during the inspection. No other operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No warning system is known to exist.

4.5 EVALUATION

Maintenance and Operation of existing facilities were adequate at the time of this inspection.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. No design data were made available to the inspection team. All the releases are made through the drop inlet structure. The owner stated that he sometimes pulls the plates (stoplogs) to lower the lake.

b. Experience Data. All of the pertinent data furnished in this report are based on computations derived from either U. S. Geological Survey 7-1/2 minute guadrangle sheet or measurements and surveys made during the field inspection.

c. Visual Observations. The spillway structures appear to be sound and debris free. See Photos 1 and 2. The following minor deficiencies were noted.

1) Erosion near the open manhole structure and part of the concrete wall is missing. See Photo 2.

2) The upstream embankment above the water level of the dam appears to be eroding from wave wash. (See Photo 5). Riprap reported by the owner to be present on the upstream slope was not visible on the date of the inspection.

3) Exit channel at CMP outlet has sediment deposition and trees and vegetation growing in channel. See Photo 3.

d. Overtopping Potential. From a safety standpoint, the hydrologic analysis of a dam is directed toward avoiding overtopping. Overtopping is especially dangerous for an earth and/or rockfill dam because the sudden onrush of water over the crest or through a crevasse will erode the face of the dam and, if continued long enough, will breach the dam embankment and release all stored waters into the downstream floodplain. The safe hydrologic design of a dam calls for a spillway discharge capability, in combination with an embankment crest height, that can handle a very large and exceedingly rare flood without overtopping the embankment. This dam overtops with less than 10 percent of the PMF (Probable Maximum Flood); at a depth of .05 feet. The depth over the dam would be .92 feet with the PMF flood with stoplogs removed. With stoplogs in place (PLATE 3A), the 10 percent PMF overtops by .16 feet and the PMF by .92 feet with a duration of 24 hours. With the plates in the slots the spillway invert is approximately the same elevation as the low point of the dam crest. Therefore, if the lake were at the top of the structure at the beginning of a rain, any rise in the lake level would overtop the dam.

Overtopping could cause a sudden failure of the dam, which would result in damages to homes located immediately below the dam (see Photo 6) and probable loss of life. No effective warning system could be implemented which would alert the residents to the danger in sufficient time to allow evacuation or remedial actions.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. No structural conditions were observed which adversely affect the stability of the dam.

b. Design and Construction Data. No detail, design, or construction data are available.

c. Operating Records. No operating records are available.

d. Post Construction Changes. No post construction changes were reported by the owner or observed.

e. Seismic Stability. Since this dam is located in seismic zone 1, it is not likely that an earthquake would occur of sufficient intensity to cause severe damage or failure of the dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. The spillway was analyzed and found to be inadequate to pass the minimum required probable maximum flood without overtopping the dam. Overtopping of the dam would be detrimental to the safety of the dam. Several maintenance items were noted during the visual inspection which left uncorrected could become detrimental to the safety of the dam. These items are: (1) broken concrete wall on the open manhole near the downstream toe; (2) erosion of the upstream slope above the water level; and (3) sediment and vegetation in the exit channel downstream of the CMP outlet.

b. Adequacy of Information. Due to the lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. Guidelines furnished for inspection of dams require that seepage and stability analyses be on file for each dam inspected. No such data are available for this dam.

c. Urgency. The engineering data required above should be obtained to assure that conventional safety margins exist.

d. Necessity for Phase II. No Phase II inspection is required.

e. Seismic Stability. This dam is located in Seismic Zone 1. and an earthquake of this magnitude is not expected to cause the dam to fail.

7.2 REMEDIAL MEASURES

a. Alternatives. Spillway size and/or dam height should be increased to pass the probable maximum flood without overtopping.

b. O&M Maintenance and Procedures. The following O&M maintenance procedures are recommended:

(1) Remove all spillway plates (stoplogs) and leave them out of the structure. This is an interim measure to reduce the risk of overtopping until spillway size/dam height can be increased.

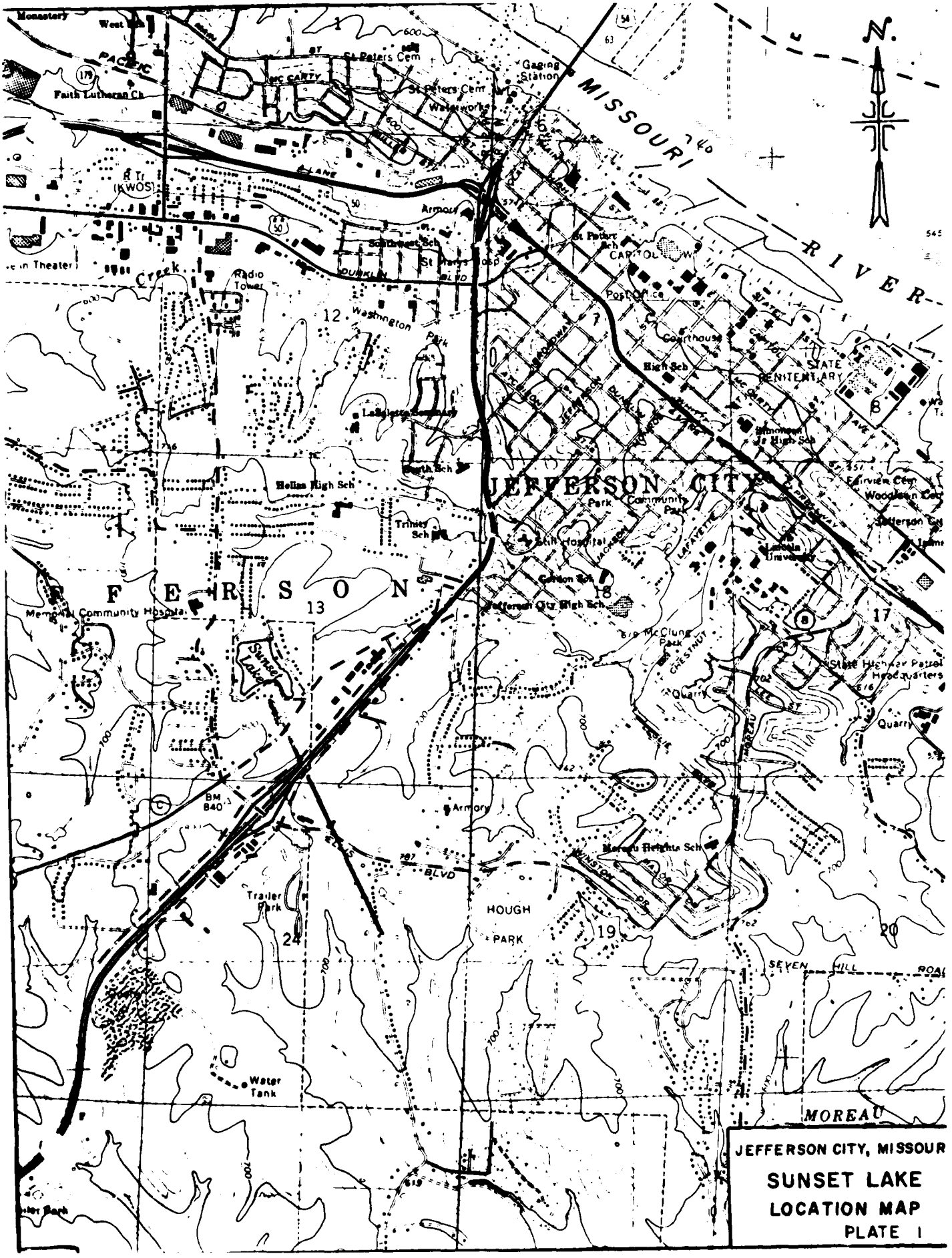
(2) Repair the broken concrete section of the open manhole and adjacent erosion.

(3) Protect upstream slope from erosion.

(4) Remove sediment and vegetation in the downstream exit channel.

APPENDIX

HYDROLOGIC COMPUTATIONS



JEFFERSON CITY, MISSOURI

SUNSET LAKE

LOCATION MAP

PLATE 1

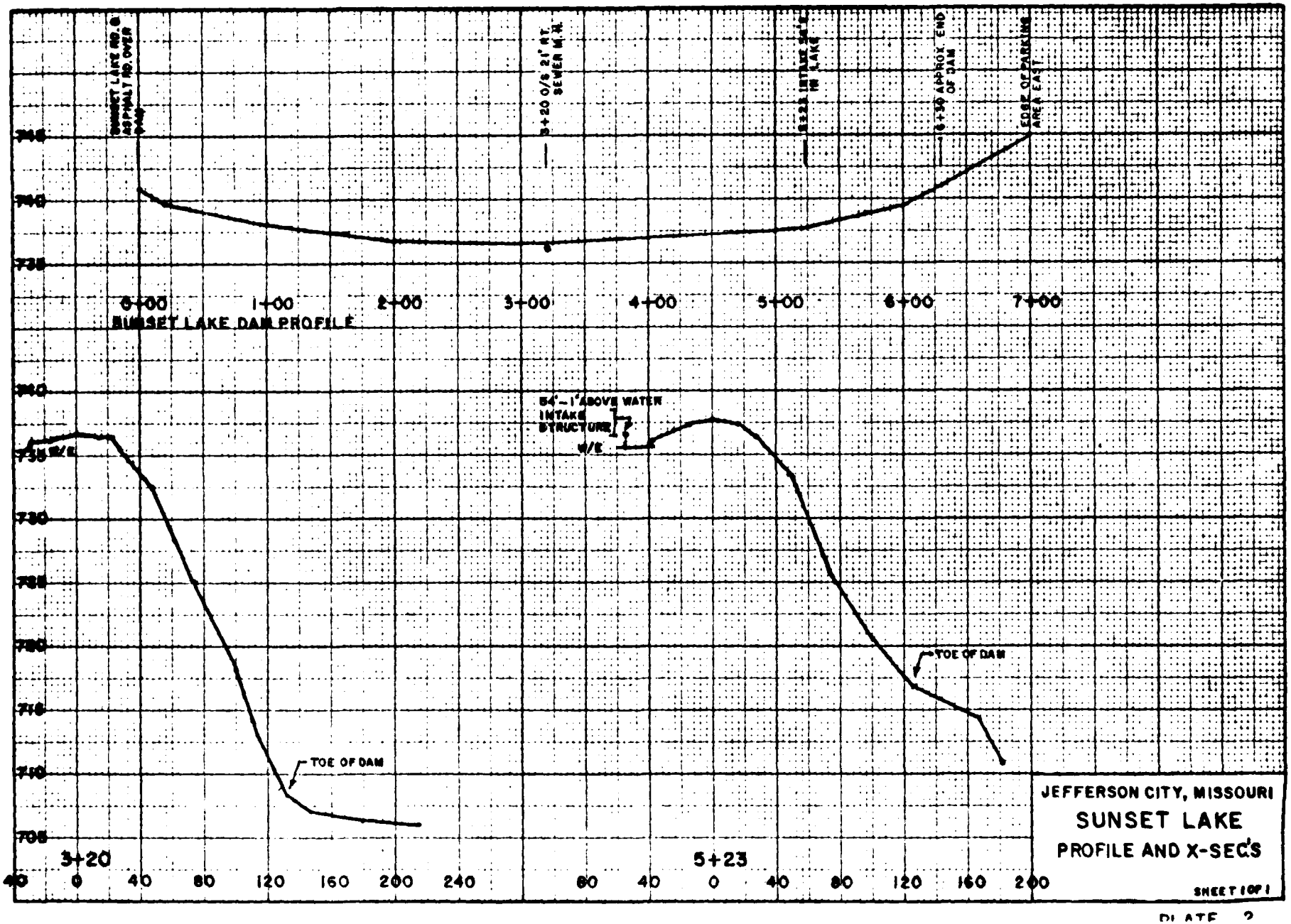

SUNSET LAKE RD. & ASPHALT RD. OVER DAM
3+20 O/S 21" RT. SEWER M.H.
5+23 INTAKE 58'-1" W. LAKE
6+30 APPROX. END OF DAM
EDGE OF PARKING AREA EAST
0+00
1+00
2+00
3+00
4+00
5+00
6+00
7+00
SUNSET LAKE DAM PROFILE
54'-1" ABOVE WATER INTAKE STRUCTURE W/E
TOE OF DAM
TOE OF DAM
3+20
5+23
JEFFERSON CITY, MISSOURI
SUNSET LAKE
PROFILE AND X-SEC'S
SHEET 1 OF 1

PLATE 2

PROJECT

SUBJECT DAM INSPECTION

SUNSET LAKE - JEFFERSON CITY, MO

Page 1 of 3

COMPUTED BY MJC DATE 4 APR 1

CHECKED BY DATE

LOCATION: JEFFERSON CITY, MO 7½ MIN QUAD.

AREAS.

DRAINAGE BASIN 99.2 ACRES (.156 M.²)

LAKE AT SPILLWAY ELEVATION (726.5) 145 "

EL 740 160 "

EL 760 [illegible]

STORAGE:

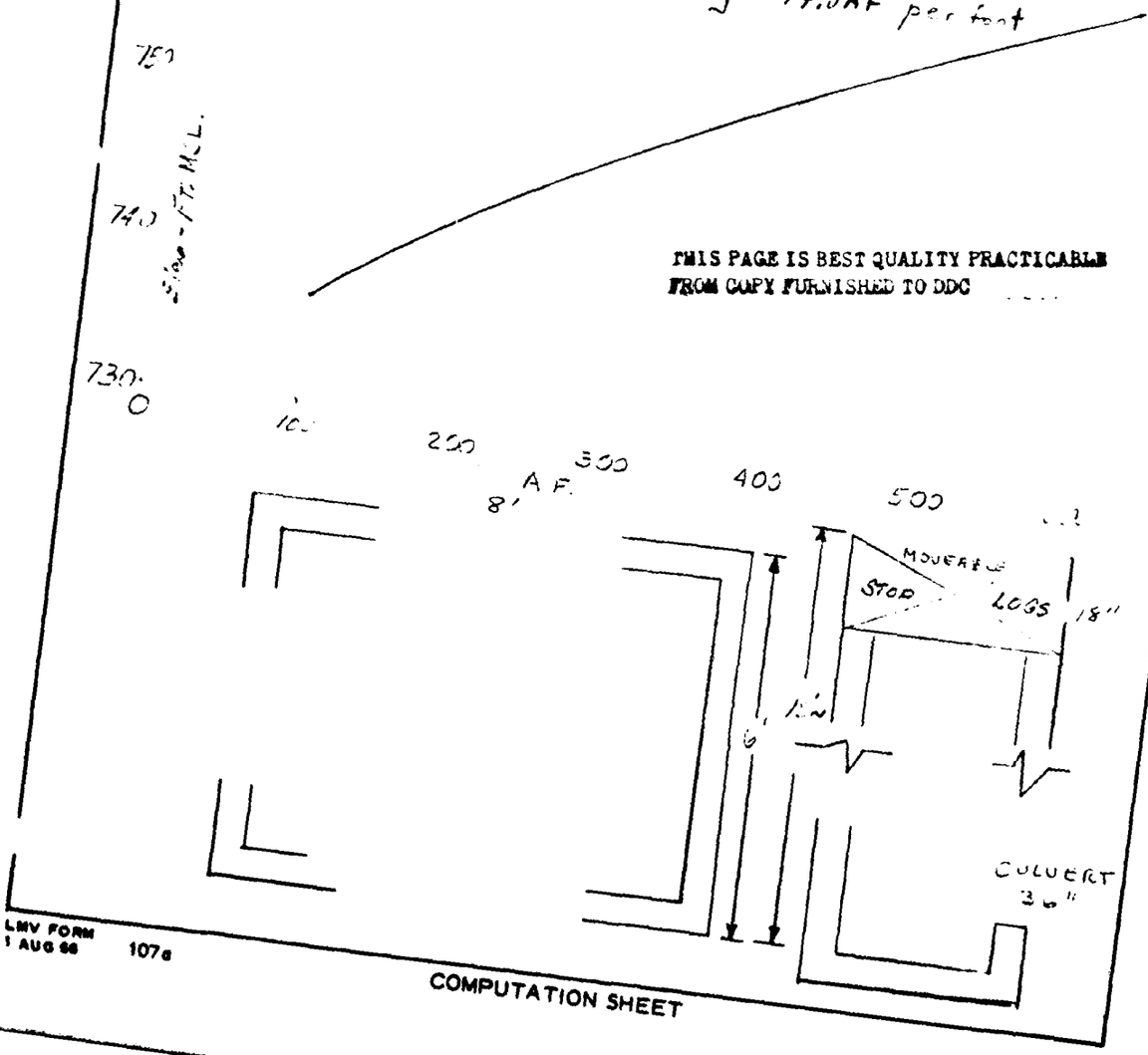
EL [illegible] 36.5 (SPILLWAY) [illegible] AF

BASE @ 740 149.3 AF

BASE @ 760 [illegible] 1.5 AF

BELOW TOP OF DAM (33.5') [illegible] AF

APPROXIMATELY 14.0 AF PER FOOT



PROJECT		COMPUTED BY	DATE
Dam Inspection	Page 2 of 3	M.C.	[illegible]
SUBJECT		**CHECKED BY**	**DATE**
Sunset Lake - [illegible] 1979			

Spillway Rating

CASE 1 WATER SURFACE El 735 - 73[illegible].5
STOPLOGS REMOVED

Weir flow thru 2 - 4 [illegible], [illegible] [illegible] gates [illegible] [illegible]
wide, 15 deep gates [illegible] - [illegible] [illegible]

Assume "C" = 3.0 $Q = CLH^{3/2}$
2 gates = to 1-11 foot section -
[illegible] (H [illegible])

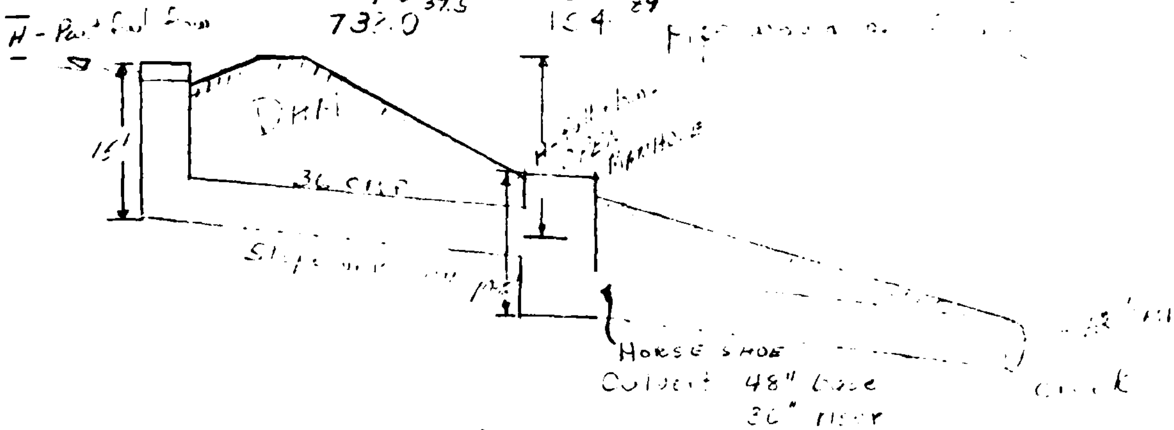
El 735	Q = 0
735.5	Q = [illegible] cfs
736.0	Q = 33 cfs
736.5	Q = 6[illegible] cfs

The 36" CMP [illegible] from [illegible] [illegible] [illegible] [illegible]
of 40 cfs flowing full [illegible] [illegible] [illegible]

CASE 2 A. Stoplogs In Water Surface [illegible] [illegible]
736.5. Flow [illegible] Full - [illegible]

EL	Q
736.5	0
737.0 37.5	30 84
737.0	154

$Q = CLH^{3/2}$ [illegible]



CASE 2B Stoplogs In. Water [illegible] [illegible] [illegible] [illegible]
flowing full Assume [illegible] [illegible], H = [illegible]
Weir intake = 13.5' L' [illegible] [illegible] [illegible]

$$Q = A\sqrt{\frac{2gH}{[illegible]L}}$$

$Q = 7.07\sqrt{\frac{[illegible]}{14.7[illegible]}}$

$Q = 29.[illegible]\sqrt{H}$

Elev	H	Q
736.5	13.5	0
737	14.0	112.0
738	15	116.0
739	16	119.0
740	17	123.0

PROJECT		Page 2 of 3	COMPUTED BY	DATE
	DAM INSPECTION		MJC.	21 Apr 1978
SUBJECT			CHECKED BY	DATE
	SUNSET LAKE - 11 APR 1978			

Spillway Rating

CASE 1 WATER SURFACE El. 735 - 736.5.
STOPLOGS REMOVED

Weir Flow thru 2 - 4 wide, 11 deep gated slots & 1 - 3' wide, 1 5 deep gated slot - 4 gate openings

Assume "C" = 3.0 $Q = CLH^{3/2}$

Egates = to 1-11 foot Sections -

$Q = 33(H^{3/2})$

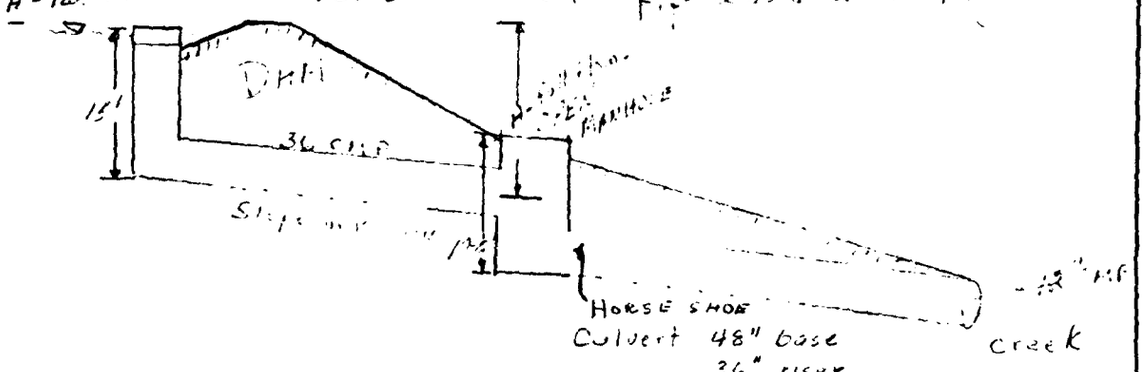
El	735	Q = 0
	735.5	Q = 11.67 cfs
	736.0	Q = 33 cfs
	736.5	Q = 60.62 cfs

The 36" CMP leaving from the weir has a capacity of 40 cfs flowing full at critical slope.

CASE 2A. Stoplogs In Water Surface at 736.5. Flow Partially Full -

EL	Q	$Q = CLH^{3/2}$
736.5	0	
737.0 (37.5)	30.84	
738.0	154	

H - Pool Full from



CASE 2B Stoplogs In. Water Surface above 736.5 Pipe flowing full Assume Flat Slope H to top of Weir intake = 13.5' L estimated 150' to spillway 0.75

$Q = A\sqrt{\frac{2gH}{1 + K_e + K_f L}}$ A = Area of CMP

$Q = 7.07\sqrt{\frac{64.4H}{1.4 + 1.5 + .0183(150)}}$

$Q = 29.86\sqrt{H}$

Elev	H	Q
736.5	13.5	0
737	14.0	112.0
738	15	116.0
739	16	119.0
740	17	123.0

PROJECT		Page 3 of 3	COMPUTED BY	DATE
DAM INSPECTION			MCC	21 MAY 1978
SUBJECT			CHECKED BY	DATE
SUNSET LAKE	NAME 78			

CASE 3 Flow over the dam. $Q = CLH^{3/2}$
Use $C = 2.75$

Top of dam from Profile is 736.5±

El.	L	H_{MAX}	H_{AVE}	Q
736.5	0			
737.0	175'	0.5	.25	64 cfs
738	390'	1.5	.75	697 cfs
739	615	2.5	1.25	1911 cfs

COMBINED STORAGE-SPILLWAY RATING ASSUMING STOPLOGS IN

El	Q	STORAGE (AF)
736.5	0	100
737.0	176	107
738.	813	121
739	2018	135

I [illegible] PMP Basin = 99.6 x 1/640 = 0.16 SQ MI

- HYDROLOGY -

1. Frequency rainfalls were obtained from TP 40 and HYDRO 35.
2. The S.C.S. Unit Hydrograph technique using estimated runoff curves was used.
3. Time of Concentration computed by Kirpich formula

$$t_c = \frac{.00013 L^{.77}}{S^{.385}}$$

L = length in ft
S = Fall ft/L

Drainage Area = 99.6 Acres - 0.16 sq miles
Length = 1.75 in x 2,000 = 3500'
S = (890 - 736.5)/3500 = 103.5/3500 = 0.044
$t_c = \frac{.00013 (3500)^{.77}}{(0.044)^{.385}} = \frac{.00013 (\quad)}{0.26} =$

t_c = 16 min.

Conservative [illegible] values were used in routing flood. Hydrographs through storage were HEC 1 (modified to) FREQ = 10, 50, 100, PMF

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33." Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use, and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the outlet works, spillway, and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-storage capacity curve. The hydraulic capacity of the outlet works, spillway, and top of dam are defined by elevation-discharge curves.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on PLATE 1A. Definitions of these variables are contained in the "User's Manual" for the computer program.

```
A  ***** PHILLIP S. EYDMANN  **   DAM SAFETY REPORT *****
A  ***** SUNSET DAM  ********** COST CODE = EL                 ***
A *****                                   *****
B    288            5
B1     5
J      1       7       1
J1   0.1     0.2     0.3     0.4   - 0.45    0.5     1.0
K      0       1                              3       1
1 ***** INFLOW HYDROGRAPH COMPUTATION *****
M      1       0    0.16                    1.00                      1
P           25.4     102     120     130
T                                                     1      .1              .20
W   .267    .161       0
X    0.0    -.02     1.5
K      1    DAM1                     2        3       1
1 ***** RESERVOIR ROUTING BY MODIFIED PULS *****
Y                            1       1
Y1     1                                             100     -1
Y4 736.5   737.0   738.0   739.0
Y5   0.0   176.0   813.0  2098.0
$S    79      93     107     121     135
$E   735     736     737     738     739
$$ 736.5
$D 736.5     2.7     1.5     510
K     99
A
A
A
A
A
EOI.
E>


  Q

C>
```

DATE= 78/08/12.
TIME= 08.36.54.

* **** PHILLIP S. EYDMANN ** DAM SAFETY REPORT *****
***** SUNSET DAM ********** COST CODE = EL ***
*****

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	5	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 7 LRTIO= 1

RTIOS= .10 .20 .30 .40 .45 .50 1.00

*********** *********** *********** *********** ***********

SUB-AREA RUNOFF COMPUTATION

***** INFLOW HYDROGRAPH COMPUTATION *****

ISTAW	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	3	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	.16	0.00	.16	1.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	25.40	102.00	120.00	130.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	.20

UNIT HYDROGRAPH DATA
TC= .27 R= .16 NTA= 0

RECESSION DATA
STRTQ= 0.00 QRCSN= -.02 RTIOR= 1.50

UNIT HYDROGRAPH 12 END-OF-PERIOD ORDINATES, LAG= .22 HOURS, CP= .69 VOL= 1.00
63. 209. 319. 265. 162. 95. 56. 33. 19. 11.
7. 4.

END-OF-PERIOD FLOW

MO,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO,DA	HR,MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	0.	1.01	12.35	151	.22	.21	.01	247.
1.01	.10	2	.01	.00	.01	1.	1.01	12.40	152	.22	.21	.01	252.
1.01	.15	3	.01	.00	.01	2.	1.01	12.45	153	.22	.21	.01	255.
1.01	.20	4	.01	.00	.01	2.	1.01	12.50	154	.22	.21	.01	256.
1.01	.25	5	.01	.00	.01	3.	1.01	12.55	155	.22	.21	.01	257.

1.01	.30	6	.01	.00	.01	3.	1.01	13.00	156	.22	.21	.01	258.
1.01	.35	7	.01	.00	.01	3.	1.01	13.05	157	.26	.25	.01	261.
1.01	.40	8	.01	.00	.01	3.	1.01	13.10	158	.26	.25	.01	270.
1.01	.45	9	.01	.00	.01	3.	1.01	13.15	159	.26	.25	.01	283.
1.01	.50	10	.01	.00	.01	3.	1.01	13.20	160	.26	.25	.01	294.
1.01	.55	11	.01	.00	.01	3.	1.01	13.25	161	.26	.25	.01	301.
1.01	1.00	12	.01	.00	.01	3.	1.01	13.30	162	.26	.25	.01	306.
1.01	1.05	13	.01	.00	.01	3.	1.01	13.35	163	.26	.25	.01	308.
1.01	1.10	14	.01	.00	.01	3.	1.01	13.40	164	.26	.25	.01	309.
1.01	1.15	15	.01	.00	.01	3.	1.01	13.45	165	.26	.25	.01	310.
1.01	1.20	16	.01	.00	.01	3.	1.01	13.50	166	.26	.25	.01	311.
1.01	1.25	17	.01	.00	.01	3.	1.01	13.55	167	.26	.25	.01	311.
1.01	1.30	18	.01	.00	.01	3.	1.01	14.00	168	.26	.25	.01	311.
1.01	1.35	19	.01	.00	.01	3.	1.01	14.05	169	.32	.32	.01	315.
1.01	1.40	20	.01	.00	.01	3.	1.01	14.10	170	.32	.32	.01	329.
1.01	1.45	21	.01	.00	.01	3.	1.01	14.15	171	.32	.32	.01	349.
1.01	1.50	22	.01	.00	.01	3.	1.01	14.20	172	.32	.32	.01	366.
1.01	1.55	23	.01	.00	.01	3.	1.01	14.25	173	.32	.32	.01	376.
1.01	2.00	24	.01	.00	.01	3.	1.01	14.30	174	.32	.32	.01	383.
1.01	2.05	25	.01	.00	.01	3.	1.01	14.35	175	.32	.32	.01	386.
1.01	2.10	26	.01	.00	.01	3.	1.01	14.40	176	.32	.32	.01	388.
1.01	2.15	27	.01	.00	.01	3.	1.01	14.45	177	.32	.32	.01	390.
1.01	2.20	28	.01	.00	.01	3.	1.01	14.50	178	.32	.32	.01	390.
1.01	2.25	29	.01	.00	.01	3.	1.01	14.55	179	.32	.32	.01	391.
1.01	2.30	30	.01	.00	.01	3.	1.01	15.00	180	.32	.32	.01	391.
1.01	2.35	31	.01	.00	.01	3.	1.01	15.05	181	.20	.19	.01	383.
1.01	2.40	32	.01	.00	.01	3.	1.01	15.10	182	.39	.39	.01	369.
1.01	2.45	33	.01	.00	.01	3.	1.01	15.15	183	.39	.39	.01	371.
1.01	2.50	34	.01	.00	.01	3.	1.01	15.20	184	.59	.58	.01	410.
1.01	2.55	35	.01	.00	.01	3.	1.01	15.25	185	.69	.68	.01	449.
1.01	3.00	36	.01	.00	.01	3.	1.01	15.30	186	1.67	1.67	.01	652.
1.01	3.05	37	.01	.00	.01	3.	1.01	15.35	187	2.76	2.75	.01	1020.
1.01	3.10	38	.01	.00	.01	3.	1.01	15.40	188	1.08	1.08	.01	1509.
1.01	3.15	39	.01	.00	.01	3.	1.01	15.45	189	.69	.68	.01	1769.
1.01	3.20	40	.01	.00	.01	3.	1.01	15.50	190	.59	.58	.01	1633.
1.01	3.25	41	.01	.00	.01	3.	1.01	15.55	191	.39	.39	.01	1317.
1.01	3.30	42	.01	.00	.01	3.	1.01	16.00	192	.39	.39	.01	1037.
1.01	3.35	43	.01	.00	.01	3.	1.01	16.05	193	.30	.30	.01	820.
1.01	3.40	44	.01	.00	.01	3.	1.01	16.10	194	.30	.30	.01	659.
1.01	3.45	45	.01	.00	.01	3.	1.01	16.15	195	.30	.30	.01	546.
1.01	3.50	46	.01	.00	.01	3.	1.01	16.20	196	.30	.30	.01	471.
1.01	3.55	47	.01	.00	.01	3.	1.01	16.25	197	.30	.30	.01	426.
1.01	4.00	48	.01	.00	.01	3.	1.01	16.30	198	.30	.30	.01	398.
1.01	4.05	49	.01	.00	.01	3.	1.01	16.35	199	.30	.30	.01	378.
1.01	4.10	50	.01	.00	.01	3.	1.01	16.40	200	.30	.30	.01	371.
1.01	4.15	51	.01	.00	.01	3.	1.01	16.45	201	.30	.30	.01	367.
1.01	4.20	52	.01	.00	.01	3.	1.01	16.50	202	.30	.30	.01	365.
1.01	4.25	53	.01	.00	.01	3.	1.01	16.55	203	.30	.30	.01	365.
1.01	4.30	54	.01	.00	.01	3.	1.01	17.00	204	.30	.30	.01	364.
1.01	4.35	55	.01	.00	.01	3.	1.01	17.05	205	.24	.23	.01	360.
1.01	4.40	56	.01	.00	.01	3.	1.01	17.10	206	.24	.23	.01	347.
1.01	4.45	57	.01	.00	.01	3.	1.01	17.15	207	.24	.23	.01	327.
1.01	4.50	58	.01	.00	.01	3.	1.01	17.20	208	.24	.23	.01	310.
1.01	4.55	59	.01	.00	.01	3.	1.01	17.25	209	.24	.23	.01	299.
1.01	5.00	60	.01	.00	.01	3.	1.01	17.30	210	.24	.23	.01	293.
1.01	5.05	61	.01	.00	.01	3.	1.01	17.35	211	.24	.23	.01	289.
1.01	5.10	62	.01	.00	.01	3.	1.01	17.40	212	.24	.23	.01	287.
1.01	5.15	63	.01	.00	.01	3.	1.01	17.45	213	.24	.23	.01	286.
1.01	5.20	64	.01	.00	.01	3.	1.01	17.50	214	.24	.23	.01	285.
1.01	5.25	65	.01	.00	.01	3.	1.01	17.55	215	.24	.23	.01	285.

PLATE IA

1.01	5.30	66	.01	.00	.01	3.	1.01	18.00	216	.24	.23	.01	285.
1.01	5.35	67	.01	.00	.01	3.	1.01	18.05	217	.02	.01	.01	271.
1	5.40	68	.01	.00	.01	3.	.01	18.10	218	.02	.01	.01	224.
.01	5.45	69	.01	.00	.01	3.	1.01	18.15	219	.02	.01	.01	159.
1.01	5.50	70	.01	.00	.01	3.	1.01	18.20	220	.02	.01	.01	107.
1.01	5.55	71	.01	.00	.01	4.	1.01	18.25	221	.02	.01	.01	67.
1.01	6.00	72	.01	.01	.01	4.	1.01	18.30	222	.02	.01	.01	44.
1.01	6.05	73	.06	.06	.01	8.	1.01	18.35	223	.02	.01	.01	35.
1.01	6.10	74	.06	.06	.01	20.	1.01	18.40	224	.02	.01	.01	34.
1.01	6.15	75	.06	.06	.01	36.	1.01	18.45	225	.02	.01	.01	32.
1.01	6.20	76	.06	.06	.01	50.	1.01	18.50	226	.02	.01	.01	31.
1.01	6.25	77	.06	.06	.01	58.	1.01	18.55	227	.02	.01	.01	30.
1.01	6.30	78	.06	.06	.01	65.	1.01	19.00	228	.02	.01	.01	29.
1.01	6.35	79	.06	.06	.01	66.	1.01	19.05	229	.02	.01	.01	28.
1.01	6.40	80	.06	.06	.01	68.	1.01	19.10	230	.02	.01	.01	27.
1.01	6.45	81	.06	.06	.01	69.	1.01	19.15	231	.02	.01	.01	25.
1.01	6.50	82	.06	.06	.01	70.	1.01	19.20	232	.02	.01	.01	24.
1.01	6.55	83	.06	.06	.01	70.	1.01	19.25	233	.02	.01	.01	23.
1.01	7.00	84	.06	.06	.01	70.	1.01	19.30	234	.02	.01	.01	23.
1.01	7.05	85	.06	.06	.01	70.	1.01	19.35	235	.02	.01	.01	22.
1.01	7.10	86	.06	.06	.01	70.	1.01	19.40	236	.02	.01	.01	21.
1.01	7.15	87	.06	.06	.01	70.	1.01	19.45	237	.02	.01	.01	20.
1.01	7.20	88	.06	.06	.01	70.	1.01	19.50	238	.02	.01	.01	19.
1.01	7.25	89	.06	.06	.01	70.	1.01	19.55	239	.02	.01	.01	18.
1.01	7.30	90	.06	.06	.01	70.	1.01	20.00	240	.02	.01	.01	18.
1.01	7.35	91	.06	.06	.01	70.	1.01	20.05	241	.02	.01	.01	18.
1.01	7.40	92	.06	.06	.01	70.	1.01	20.10	242	.02	.01	.01	18.
1.01	7.45	93	.06	.06	.01	70.	1.01	20.15	243	.02	.01	.01	18.
1.01	7.50	94	.06	.06	.01	70.	1.01	20.20	244	.02	.01	.01	18.
1.01	7.55	95	.06	.06	.01	70.	1.01	20.25	245	.02	.01	.01	18.
1.01	8.00	96	.06	.06	.01	70.	1.01	20.30	246	.02	.01	.01	18.
1.01	8.05	97	.06	.06	.01	70.	1.01	20.35	247	.02	.01	.01	18.
1.01	8.10	98	.06	.06	.01	70.	1.01	20.40	248	.02	.01	.01	18.
1.01	8.15	99	.06	.06	.01	70.	1.01	20.45	249	.02	.01	.01	18.
1.01	8.20	100	.06	.06	.01	70.	1.01	20.50	250	.02	.01	.01	18.
1.01	8.25	101	.06	.06	.01	70.	1.01	20.55	251	.02	.01	.01	18.
1.01	8.30	102	.06	.06	.01	70.	1.01	21.00	252	.02	.01	.01	18.
1.01	8.35	103	.06	.06	.01	70.	1.01	21.05	253	.02	.01	.01	18.
1.01	8.40	104	.06	.06	.01	70.	1.01	21.10	254	.02	.01	.01	18.
1.01	8.45	105	.06	.06	.01	70.	1.01	21.15	255	.02	.01	.01	18.
1.01	8.50	106	.06	.06	.01	70.	1.01	21.20	256	.02	.01	.01	18.
1.01	8.55	107	.06	.06	.01	70.	1.01	21.25	257	.02	.01	.01	18.
1.01	9.00	108	.06	.06	.01	70.	1.01	21.30	258	.02	.01	.01	18.
1.01	9.05	109	.06	.06	.01	70.	1.01	21.35	259	.02	.01	.01	18.
1.01	9.10	110	.06	.06	.01	70.	1.01	21.40	260	.02	.01	.01	18.
1.01	9.15	111	.06	.06	.01	70.	1.01	21.45	261	.02	.01	.01	18.
1.01	9.20	112	.06	.06	.01	70.	1.01	21.50	262	.02	.01	.01	18.
1.01	9.25	113	.06	.06	.01	70.	1.01	21.55	263	.02	.01	.01	18.
1.01	9.30	114	.06	.06	.01	70.	1.01	22.00	264	.02	.01	.01	18.
1.01	9.35	115	.06	.06	.01	70.	1.01	22.05	265	.02	.01	.01	18.
1.01	9.40	116	.06	.06	.01	70.	1.01	22.10	266	.02	.01	.01	18.
1.01	9.45	117	.06	.06	.01	70.	1.01	22.15	267	.02	.01	.01	18.
1.01	9.50	118	.06	.06	.01	70.	1.01	22.20	268	.02	.01	.01	18.
1.01	9.55	119	.06	.06	.01	70.	1.01	22.25	269	.02	.01	.01	18.
1.01	10.00	120	.06	.06	.01	70.	1.01	22.30	270	.02	.01	.01	18.
1.01	10.05	121	.06	.06	.01	70.	1.01	22.35	271	.02	.01	.01	18.
1.01	10.10	122	.06	.06	.01	70.	1.01	22.40	272	.02	.01	.01	18.
1.01	10.15	123	.06	.06	.01	70.	1.01	22.45	273	.02	.01	.01	18.
1.01	10.20	124	.06	.06	.01	70.	1.01	22.50	274	.02	.01	.01	18.
1.01	10.25	125	.06	.06	.01	70.	1.01	22.55	275	.02	.01	.01	18.

PLATE 1A

1.01	10.30	126	.06	.06	.01	70.	1.01	23.00	276	.02	.01	.01	18.
1.01	10.35	127	.06	.06	.01	70.	1.01	23.05	277	.02	.01	.01	18.
1.01	10.40	128	.06	.06	.01	70.	1.01	23.10	278	.02	.01	.01	18.
1.01	10.45	129	.06	.06	.01	70.	1.01	23.15	279	.02	.01	.01	18.
1.01	10.50	130	.06	.06	.01	70.	1.01	23.20	280	.02	.01	.01	18.
1.01	10.55	131	.06	.06	.01	70.	1.01	23.25	281	.02	.01	.01	18.
1.01	11.00	132	.06	.06	.01	70.	1.01	23.30	282	.02	.01	.01	18.
1.01	11.05	133	.06	.06	.01	70.	1.01	23.35	283	.02	.01	.01	18.
1.01	11.10	134	.06	.06	.01	70.	1.01	23.40	284	.02	.01	.01	18.
1.01	11.15	135	.06	.06	.01	70.	1.01	23.45	285	.02	.01	.01	18.
1.01	11.20	136	.06	.06	.01	70.	1.01	23.50	286	.02	.01	.01	18.
1.01	11.25	137	.06	.06	.01	70.	1.01	23.55	287	.02	.01	.01	18.
1.01	11.30	138	.06	.06	.01	70.	1.02	0.00	288	.02	.01	.01	18.
1.01	11.35	139	.06	.06	.01	70.	1.02	.05	289	0.00	0.00	0.00	17.
1.01	11.40	140	.06	.06	.01	70.	1.02	.10	290	0.00	0.00	0.00	16.
1.01	11.45	141	.06	.06	.01	70.	1.02	.15	291	0.00	0.00	0.00	16.
1.01	11.50	142	.06	.06	.01	70.	1.02	.20	292	0.00	0.00	0.00	15.
1.01	11.55	143	.06	.06	.01	70.	1.02	.25	293	0.00	0.00	0.00	15.
1.01	12.00	144	.06	.06	.01	70.	1.02	.30	294	0.00	0.00	0.00	14.
1.01	12.05	145	.22	.21	.01	80.	1.02	.35	295	0.00	0.00	0.00	13.
1.01	12.10	146	.22	.21	.01	111.	1.02	.40	296	0.00	0.00	0.00	13.
1.01	12.15	147	.22	.21	.01	158.	1.02	.45	297	0.00	0.00	0.00	12.
1.01	12.20	148	.22	.21	.01	199.	1.02	.50	298	0.00	0.00	0.00	12.
1.01	12.25	149	.22	.21	.01	223.	1.02	.55	299	0.00	0.00	0.00	11.
1.01	12.30	150	.22	.21	.01	238.	1.02	1.00	300	0.00	0.00	0.00	11.
									SUM	33.02	30.77	2.25	38123.
										(839.)	(782.)	(57.)	(1079.52)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1769.	431.	132.	127.	38146.
CMS	50.	12.	4.	4.	1080.
INCHES		25.04	30.78	30.80	30.80
MM		636.05	781.78	782.38	782.38
AC-FT		214.	263.	263.	263.
THOUS CU M		263.	324.	324.	324.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	177.	43.	13.	13.	3815.
CMS	5.	1.	0.	0.	108.
INCHES		2.50	3.08	3.08	3.08
MM		65.60	78.18	78.24	78.24
AC-FT		21.	26.	26.	26.
THOUS CU M		26.	32.	32.	32.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	354.	86.	26.	25.	7629.
CMS	10.	2.	1.	1.	216.
INCHES		5.01	6.16	6.16	6.16
MM		127.21	156.36	156.48	156.48
AC-FT		43.	53.	53.	53.
THOUS CU M		53.	65.	65.	65.

PLATE 1A

WITH STOPLOGS REMOVED
PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .45	RATIO 6 .50	RATIO 7 1.00
HYDROGRAPH AT	1	.16	1	177.	354.	531.	708.	796.	885.	1769.
	(	.41)	(	5.01)(	10.02)(	15.03)(	20.04)(	22.55)(	25.05)(	50.10)(
ROUTED TO	DAM1	.16	1	31.	297.	460.	626.	713.	803.	1658.
	(	.41)	(	.89)(	8.40)(	13.01)(	17.72)(	20.19)(	22.75)(	46.96)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	735.00	736.50	736.50
STORAGE	79.	100.	100.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	736.55	.05	101.	31.	8.33	17.33	0.00
.20	736.78	.28	104.	297.	10.08	15.83	0.00
.30	736.88	.38	105.	460.	11.25	15.83	0.00
.40	736.98	.48	107.	626.	12.00	15.83	0.00
.45	737.02	.52	107.	713.	12.25	15.83	0.00
.50	737.07	.57	108.	803.	12.50	15.83	0.00
1.00	737.42	.92	113.	1658.	15.42	15.83	0.00

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 3 AUG 78
****
EOI.
E>C
C>PURGE,PE44
C>

WITH STOPLOGS IN PLACE
PEAK FLOW AND STORAGE (*END OF PERIOD*) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .45	RATIO 6 .50	RATIO 7 1.00
HYDROGRAPH AT	1	.16	1	177.	354.	531.	708.	796.	885.	1769.
		(.41)	(	5.01)(	10.02)(	15.03)(	20.04)(	22.55)(	25.05)(	50.10)(
ROUTED TO	DAM1	.16	1	143.	297.	460.	626.	713.	803.	1658.
		(.41)	(	4.05)(	8.42)(	13.01)(	17.72)(	20.19)(	22.75)(	46.96)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	736.50	736.50	736.50
STORAGE	100.	100.	100.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	736.66	.16	102.	143.	24.00	15.92	0.00
.20	736.78	.28	104.	297.	24.00	15.83	0.00
.30	736.88	.38	105.	460.	24.00	15.83	0.00
.40	736.98	.48	107.	626.	24.00	15.83	0.00
.45	737.02	.52	107.	713.	24.00	15.83	0.00
.50	737.07	.57	108.	803.	24.00	15.83	0.00
1.00	737.42	.92	113.	1658.	24.00	15.83	0.00

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1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  3 AUG 78
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PLATE 3A

PHOTO 1: Drop Inlet Spillway

PHOTO 2: Thirty-six Inch Spillway Exit Pipe

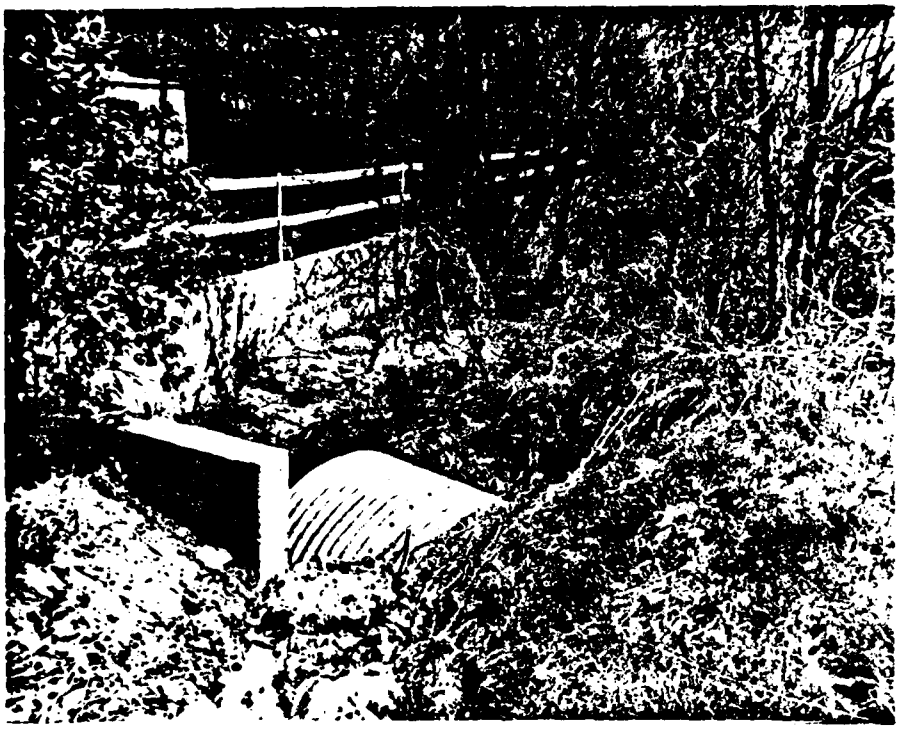

PHOTO 3: Spillway Exit Channel

PHOTO 4: Downstream Slope

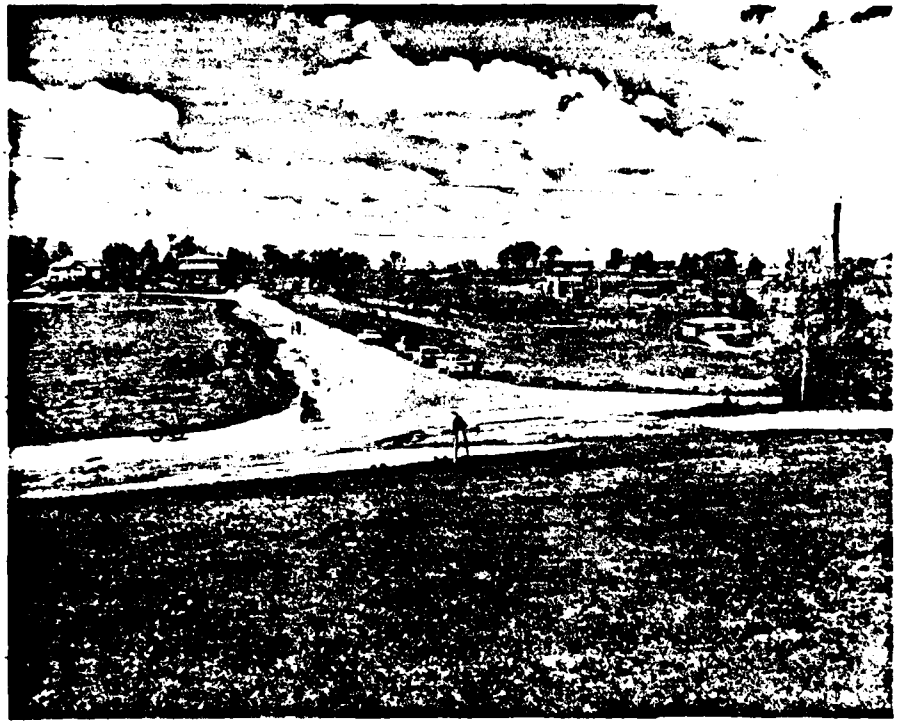

PHOTO 5: Upstream Slope Above Water Level

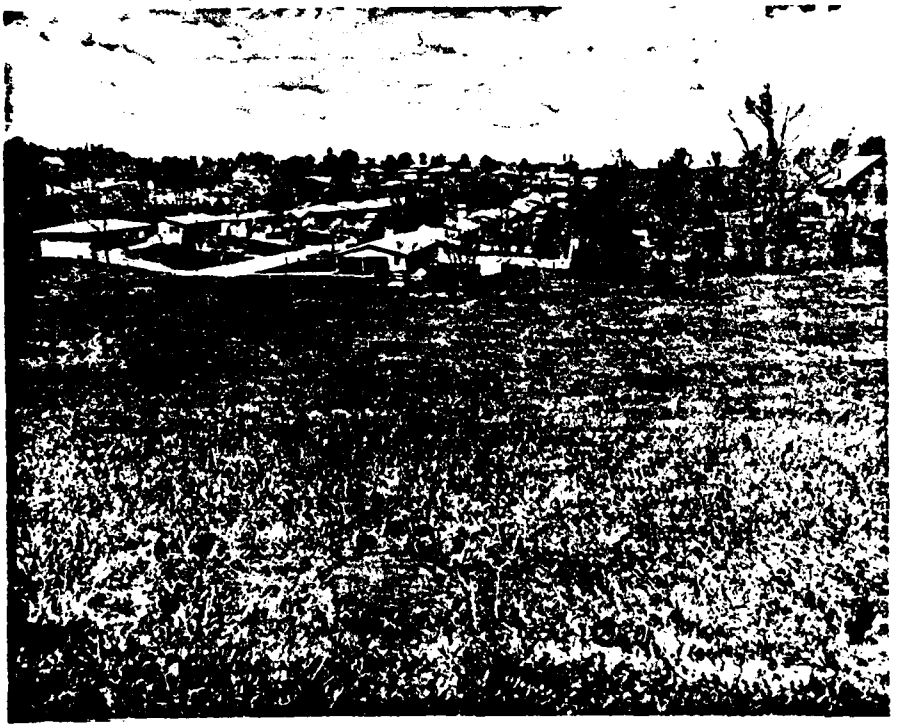

PHOTO 6: Homes Downstream of Dam